Mohamad Qadri

https://www.cs.cmu.edu/~mqadri

✉ mqadri@andrew.cmu.edu   ☏ +1 (240) 474-2481

Education

Carnegie Mellon University — Robotics Institute, *Pittsburgh, PA*
PhD in Robotics (2nd year)   *Aug. 2021 – Current.*

Carnegie Mellon University — Robotics Institute, *Pittsburgh, PA*
Master of Science in Robotics   *Aug. 2019 – Aug. 2021*
GPA: 4.14 / 4.33

University of Maryland — A James Clark School of Engineering, *College Park, MD*
Bachelor of Science in Electrical Engineering   *Aug. 2012 – Dec. 2016*
GPA: 4.0 / 4.0 (*Summa Cum Laude*)

Research Experience

Carnegie Mellon University - Robotics Institute
Advisor: Dr. Michael Kaess

- My general interests are in the areas of numerical and differentiable optimization, and end-to-end structured learning applied to problems in motion planning and state estimation in robotics.
  - Developed InCOpt, an Augmented Lagrangian-based incremental constrained optimizer that views matrix operations as message passing on the Bayes tree. It incorporates hard constraints into iSAM2 (an incremental least squares solver).
- Worked on underwater 3D reconstruction and mapping.
  - Developed a technique for dense 3D reconstruction of objects using imaging sonars where the geometry is represented as a neural implicit function.

Carnegie Mellon University - Robotics Institute
Advisor: Dr. George Kantor

Research in the area of simultaneous localization and mapping (SLAM), 3D reconstruction, and mobile manipulation in agricultural fields.

- Worked on SLAM algorithms that combine advances in deep learning with traditional vision pipelines to create object-level 3D models of agricultural fields.
- Developed a manipulation and planning strategy for autonomous data collection in apple orchards using an in-hand robotic arm which was further integrated with a fully autonomous navigation pipeline.

Carnegie Mellon University - Robotics Institute
Advisors: Dr. Laszlo Jeni and Dr. Simon Lucey

Research in the area of 3D reconstruction (non-rigid structure from motion, single image 3D reconstruction) and semi-supervised learning.

- Investigated the usage of geometric priors for better utilization of unlabeled data for image-based 3D reconstruction using deep networks.
- Developed a computer vision system, with a deep network at its core, to estimate the 3D pose and shape of hands from a single image. (system ranked first for several months in the Freihand CodaLab competition).

University of Maryland - College Park — Maryland Cybersecurity Center (MC2)
Advisor: Dr: Charalampos (Babis) Papamanthou   *Sep. 2016 – Dec. 2016*

- ***Secure Storage with Bitcoin:*** Prototyped a new Bitcoin transaction (prototyped using the Java Bitcoinj library) to provide payment to cloud storage provider if the stored files in the cloud are proven not to have been modified or corrupted.

ViaSat, Inc
Undergraduate Research Fellowship   *Oct. 2015 – May. 2016*

- Implemented a web based portal for primary and Virtual Network Operator access.
- Designed and implemented data analytics to derive insight into network operation and event/performance correlation.
- Evaluated Key Performance Indicators for cellular sites and developed tiered access and data views.

Work Experience

ViaSat, Inc, *Germantown, MD*
Software Engineer   *Jan. 2017 – Aug. 2019*

- Developed and maintained a high availability configuration management platform for the ground segment of the ViaSat satellite internet network.
- Developed and maintained a Monitoring and Control (M&C) system which was deployed and used by customers in South America and Australia.

Software Engineering Intern   *May. 2016 – Dec. 2016*

- Developed a Monitoring and Control System software for a satellite-based communication system product which expands existing Global System for Mobile communications (GSM) and land telephony networks via satellite.

Ericsson, *Piscataway, NJ*
RF Engineering part-time intern   *Aug. 2015 – May. 2016*
○ Developed a Pseudo-random Noise (PN) audit tool based on sector's coordinate and frequency to detect interference issues in wireless mobile networks.

RF Engineering summer intern   *May. 2015 – Aug. 2015*
○ Monitored network reconfiguration and deployment of 3G and 4G wireless networks.

Relevant Skills

Programming languages: C, C++, Python, JavaScript
Simulators: Mujoco, Rviz, Gazebo
Packages and Frameworks: OpenCV, GTSAM, Tensorflow, Pytorch, JAX
Software: ROS, Matlab

Courses

Advanced Machine Learning, Probabilistic Graphical Models, Optimal Control and Reinforcement Learning, Planning and Decision Making in Robotics, Statistical Techniques in Robotics, Machine Learning, Kinematics Dynamics and Control, Computer Vision, Digital Signal Processing, Control Systems, Digital Control Systems, Computer Systems Security, Electromagnetic Wave Propagation, Signal and System Theory, Electronic Circuit Design.

Services

- Autonomous Robots (Reviewer 2021-2023)

- ICRA 2021 (Reviewer)

- CMU Masters in Robotics Admission Committee (2022-2023)

- CMU AI Mentoring Program (2022-2023)

Awards

- Paul and Daisy Soros Fellowship (Finalist 2023)

- UMD ECE Undergraduate Research Fellowship

- ECE Faculty Endowed Scholarship

- University of Maryland Senior Marshal

Publications and Pre-Prints

- Qadri, Mohamad, Michael Kaess, and Ioannis Gkioulekas. "Neural Implicit Surface Reconstruction using Imaging Sonar." *to appear in IEEE International Conference on Robotics and Automation* (ICRA 2023).

- Lin, Tianxiang, Akshay Hinduja, Mohamad Qadri, and Michael Kaess. "Conditional GANs for Sonar Image Filtering with Applications to Underwater Occupancy Mapping." *to appear in IEEE International Conference on Robotics and Automation* (ICRA 2023).

- Bakhshalipour, Mohammad, Mohamad Qadri, Dominic Guri, Seyed Borna Ehsani, Maxim Likhachev, and Phillip Gibbons. "Runahead A* : Speculative Parallelism for A* with Slow Expansions." *to appear in International Conference on Automated Planning and Scheduling* (ICAPS 2023).

- Qadri Mohamad, Paloma Sodhi, Joshua Mangelson , Frank Dellaert , and Michael Kaess, "Incopt: Incremental constrained optimization using the bayes tree" *In IEEE/RSJ Intl. Conf. on Intelligent Robots and Systems. Vol. 6.* (IROS 2022).

- Bakhshalipour, Mohammad, Seyed Borna Ehsani, Mohamad Qadri, Dominic Guri, Maxim Likhachev, and Phillip B. Gibbons. "RACOD: algorithm/hardware co-design for mobile robot path planning." *In Proceedings of the 49th Annual International Symposium on Computer Architecture, pp. 597-609.* (ISCA 2022).

- Freeman, Harry, Mohamad Qadri, Abhisesh Silwal, Paul O'Connor, Zachary Rubinstein, Daniel Cooley, and George Kantor. "Autonomous Apple Fruitlet Sizing and Growth Rate Tracking using Computer Vision." *Under Review in IEEE Transactions in Robotics* (TRO).

- Qadri, Mohamad, Harry Freeman, Franz Eric Schneider, and George Kantor. "Toward Semantic Scene Understanding for Fine-Grained 3D Modeling of Plants." *In AI for Agriculture and Food Systems.* (AIAFS AAAI 2021).

- Qadri, Mohamad. Robotic Vision for 3D Modeling and Sizing in Agriculture. *Master's thesis, Carnegie Mellon University, Pittsburgh, PA* (2021).

- Qadri, Mohamad, and George Kantor. "Semantic Feature Matching for Robust Mapping in Agriculture." *arXiv preprint arXiv:2107.04178* (2021).

- Bakhshalipour, Mohammad, Mohamad Qadri, and Dominic Guri. "Speculative Path Planning." *arXiv preprint arXiv:2102.06261* (2021).